



FLIGHT

The
AIRCRAFT
ENGINEER
&
AIRSHIPS



First Aero Weekly in the World.
Founder and Editor : STANLEY SPOONER
A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 680. (No. 1, Vol. XIV.)

JANUARY 5, 1922

Weekly. Price 6d.
Post free, 7d.

Flight,

The Aircraft Engineer and Airships

Editorial Offices : 36, GREAT QUEEN STREET, KINGSWAY, W.C.2
Telegrams : Truditur, Westcent, London. Telephone : Gerrard 1828
Annual Subscription Rates, Post Free :
United Kingdom .. 30s. 4d. Abroad .. 33s. 6d.*
These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates
* European subscriptions must be remitted in British currency

CONTENTS

	PAGE
Editorial Comment	
Progress of Civil Aviation	1
The Suppression of Flying	2
Aerial Advertising—A Terrible Prospect	2
London-Paris from the Air: Boulogne	3
De Havilland 34 Biplane	4
The Friesley "Falcon" Cabin Biplane	5
Royal Aero Club Official Notices	6
The Curtiss Model CD-12 400 H.P. Aero Engine	7
Personals	9
The New Royal Air Force Club	10
London Terminal Aerodrome	10
Civil Aviation in 1921: Half-Yearly Report of C.G.C.A.	11
Honours	12
Royal Air Force	13
Royal Air Force Intelligence	13
London-Continental Services	13
Sidewinds	14

EDITORIAL COMMENT



LSEWHERE in this issue we publish a brief *résumé* of the Fifth Half-Yearly Report on the Progress of Civil Aviation. As in the case of previous reports, the present one is signed by Sir Frederick Sykes, Controller-General of Civil Aviation. It is divided into two main parts, the first of which deals with Civil Aviation in Great Britain and the Empire, the second being devoted to Civil Aviation in Foreign Countries. As usual, a lot of interesting and useful data are included in the report, and the figures given, looking at the matter in the broadest possible light, are distinctly encouraging.

When, however, it comes to examining the part played by Great Britain, the matter assumes a somewhat different aspect. Good as the figures are, they do not disclose a very progressive and promising state of affairs as compared with what is being done, and particularly what is being planned, by other nations, chiefly in the matter of Government subsidy. For instance, out of a total number of aircraft arrivals and departures from and to the Continent of 2,360 during the six months under review, British machines account for only 671. It is true that we are not running services to Belgium and Holland, and that therefore the comparison should be made with the French service. Even then the figure for French machines only exceeds that of ours, being 1,058 against our 671. The total of Belgian and Dutch arrivals and departures is 631, or very nearly equal to ours, so that it would appear that, if it is worth while keeping the London-Paris services going, it is no less so with regard to Belgian and Dutch lines. However, the report states that in the spring a service to Belgium will be inaugurated.

Again, although the total number of passengers carried is as high as 31,853, those carried between the United Kingdom and the Continent only total 4,000. In other words, the majority of the rest were carried by joy-riding firms and firms doing "air-taxi" work, which, as Mr. Holt Thomas points out in a letter to *The Times*, is not air service in the ordinary sense of the words. Let us be clear, however, that in making these comparisons we are casting no reflections on the Department of Civil

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.
- Jan. 5

Lecture, "Specialised Aircraft," by Wing-Com. W. D. Beatty, before R.Ae.S.
- Jan. 19

Lecture, "Aeroplane Installation," by Brig.-Gen. R. K. Bagnall-Wild, before R.Ae.S.
- Feb. 2

Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.
- Feb. 7 & 8

Second Air Conference at Guildhall
- Feb. 16

Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.
- Mar. 2.

Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.
- Mar. 26-
- April 2

Nice Meeting
- Mar. 30

Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.
- July 6-20

French Gliding Competition
- Aug. 6

Gordon-Bennett Balloon Race, Geneva
- Sept.

Tyrrhenian Cup, Italy
- Sept.

Italian Grand Prix

Aviation, which is, we are sure, doing its best with the means at its disposal.

In an appendix to the report this Department deals in a most decisive and convincing manner with the question of the development of civil air communications within the Empire, and shows such a sane and practical grasp of the subject that one cannot fail to realise that, did the matter rest with General Sykes's Department, Imperial aviation would soon take the place which no one seriously doubts it is destined to take ultimately. But unfortunately the Department of Civil Aviation has to work with the scant material provided by the Treasury, and is thus vitally handicapped.

Mr. Holt Thomas's letter contains an excellent example of the way in which this country is lagging behind. Compared with our "28 per cent. share in the London-Paris service," America has, he reminds us, some 3,000 miles of Air Mail lines over which, in the month of October last, the mileage flown was 158,971 miles.

The report states that the Treasury has agreed to set aside a sum of £200,000 per annum for the next three years out of the total Vote for Civil Aviation purposes, to be used as direct assistance to "approved" firms. This figure looks fairly large. Yet when we come to examine those of other countries we find that by comparison it is insignificant. For instance, the subsidy proposed by France for 1922 is 41,382,000 francs, about £1,655,000 at normal rate of exchange. Germany's proposed subsidy is 11,000,000 marks for operational and 10,000,000 marks for constructional firms. Out of our £200,000 per annum approximately half, it is stated, will be devoted to the purchase of machines for use by the operational firms on the hire-purchase system. Even a small country like Holland is proposing a subsidy for 1922 of 370,000 florins (£30,000).

As we have repeated until we are tired of it, and quite apart from its very practical utility, civil aviation is to be regarded as a form of national insurance, and it amounts almost to criminal indifference to suggest we cannot afford it. We simply cannot afford not to foster it.

The Suppression of Flying

Under this heading Mr. A. F. Prevost Battersby, in the *Observer* last Sunday, returns to the subject indicated, a theme which he reminds us he voiced some five years ago in the same paper. He seeks again "to rouse unimaginative humanity to a consciousness of its impending peril." Mr. Battersby then proceeds to repeat his old plea for the suppression of all flying, by reason of it being possible in the future, through the aeroplane, to achieve "the destruction within 24 hours of a score of cities, arsenals, dockyards and military centres before any sort of reprisal can be devised," and continues, "It is vain to talk of an air service adequate to deal with such a contingency," which, as Euclid has it, is absurd.

Thus Mr. Battersby lets loose again all his old scare lines, and in addition quotes various recent utterances by more or less responsible public speakers as evidence in support of his indictment, but he omits

to point out that those very utterances have been put forward as imperative reasons why Britain should provide an adequate air service to deal with the very contingency which Mr. Battersby appears to think is likely to eventuate. In fact, as we said when commenting upon Mr. Battersby's original cry of agony five years ago, every argument he puts forward for suppression is an indictment of his own arguments. To attempt at this stage of aviation to stay further development of the navigation of the air is almost on a par with commanding the sea to retire.

No, the building up of a huge commercial aircraft industry in the coming years is as sure a certainty as anything in this world can be, and because such a beneficial opening for mankind may be abused by possible Huns of the future, is not sufficient reason to call a halt. As to Mr. Battersby's "facts," we need but quote one item as showing the flimsy basis upon which his "peril to humanity" bogey is erected:

"So accurate has bombing become that an expert has dropped three dummy bombs in succession down the funnels of a warship from a height of some 6,000 feet." It is evident that Mr. Battersby, whilst there is still time, should arrange to retire to a "dug-out" which he prophesies will constitute the future residences of the new poor, war profiteers, and all other wildfowl.

Aerial Advertising—A Terrible Prospect

According to the *Star*—which, perhaps, is not to be taken too seriously—there is a scheme on foot for using the London-Lympne air route for the purpose of advertising the wares of a well-known firm of pickle and preserve manufacturers. It is, so the *Star* tells us, the intention to lay down enormous ground signs showing white on a black ground by day, and to be outlined by innumerable electric lamps by night, extolling the excellencies of the "57 varieties." As though this were not bad enough, it is further intended to employ small, fast aeroplanes, flown by "stunt" pilots to write smoke signs in the sky—signs that will be visible to all within a wide radius and which, on a quiet day, will be legible for quite a considerable time.

We are firm believers in the virtue of advertising. We do not believe that any business, great or small, can be created and maintained without the powerful aid of advertisement. But there are limits, and this grandiose scheme seems to surpass the limit of what is allowable either on the grounds of good taste—which has no particular appeal to a certain class of advertising man—or public policy. It is distinctly against the latter that such a scheme should be permitted. Our railways are lined by such outrages on good taste. If they were the least bit artistic we might endure them, but they are not. To these atrocities of the advertising world, are we to have added the terrors of enormous illuminated signs, shouting to the world that there is nothing like the 57 varieties, and must we endure the sight of smoke-screen inscriptions on the very clouds themselves? Not for a moment. And it will be as well if the authorities early make it abundantly clear that this sort of thing will not be permitted.

Civilian Flying during 1921 in America

ACCORDING to a review compiled by the Aeronautical Chamber of Commerce of America, civilian flying increased considerably during 1921. Twelve hundred aircraft were operated by civilians, flying a total of more than 6,500,000

miles, and carrying approximately 275,000 passengers. The United States Air Mail also put up a very good record of efficiency over the transcontinental route during the last twelve months, having shown an average of 88.82 per cent. efficiency (completed trips on scheduled time).



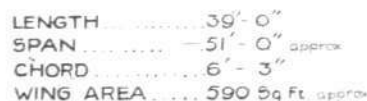
LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE :

No. 21.—*Top* : A Wreck off Boulogne; *Below* : Boulogne Harbour.

Napier "Lion" Engine

In the construction of the *fuselage* considerable simplification has been effected. This structure is now entirely covered with three-ply, so that there will be no trueing-up to attend to during use. Also, in case of a forced descent on the sea, this form of construction gives great flotation, as the cabin

The undercarriage is similar to that which has proved so successful on the 18's, its main feature being long shock absorber extension (12 ins.) and oleo damping gear. The



D. H. 34
450 HP NAPIER "LION"
ENGINE

The engine installation is similar to that of the 18 already described in this journal. By undoing four bolts and the petrol and engine connections the whole engine unit can be removed. An underslung radiator is fitted which can be removed without disturbing the propeller. The petrol tanks are placed some distance out, under the top plane, and there

Economical as was the D.H. 18, the 34 promises to be considerably more so, and the figure for ten-miles per gallon should work out very well as compared with other rapid means of transport, especially when it is remembered that this machine does its travel at the rate of over 100 m.p.h., while older means rarely average half of that speed. As there is a considerable reserve of power which can be used in case of head winds, etc., the machine should be able to maintain its average of 100 m.p.h. with good regularity, even under unfavourable conditions. Later on, when construction has progressed a little further, we hope to be able to publish sketches of some constructional details.

THE FRIESLEY "FALCON" CABIN BIPLANE

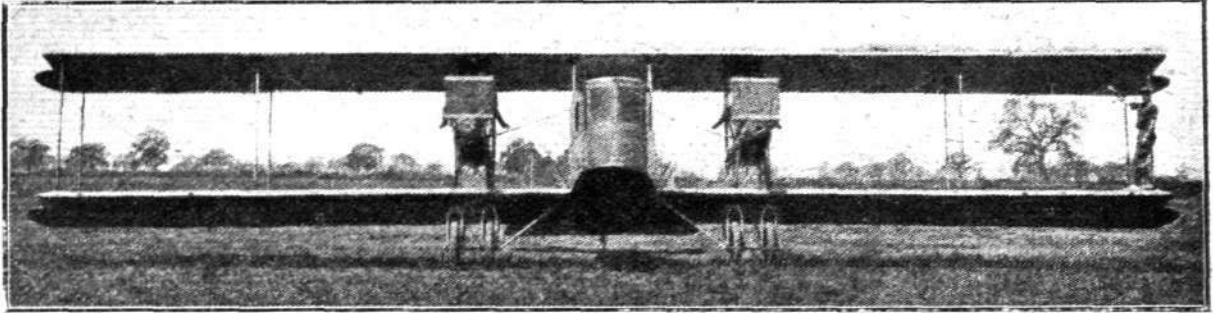
WE give below some particulars, with accompanying illustrations, of an American-built 12-passenger twin-engined Liberty (low-compression) biplane, the Friesley "Falcon." This machine, which is of the enclosed cabin type, made its first public test flight last April at Friesley Field, California, piloted by B. M. Spencer (late of the U.S. Air Service), who was also responsible for the designing and building of the machine.

The "Falcon" left the ground after a run of less than

extends out a considerable distance forward of the wings, the visibility is exceptionally good. Large windows are provided all round the sides of the cabin, and celluloid ports are also fitted in the roof, giving the pilot a good view overhead. All instruments are arranged on a desk immediately in front of the pilot, and under this desk, readily accessible, are the storage batteries for the engines.

Aft of the passengers' section is a luggage compartment measuring 4 ft. by 5 ft. by 4 ft.

The Friesley
"Falcon"
Cabin Biplane:
Front view.

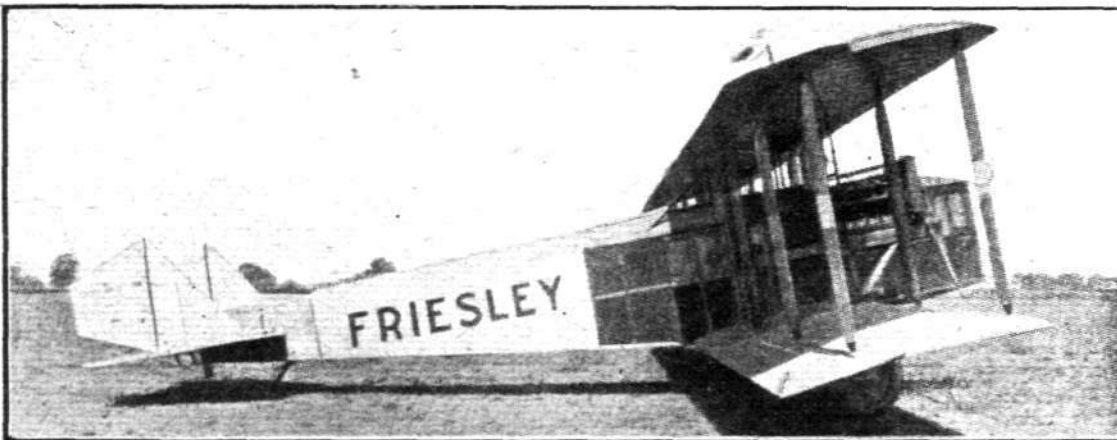


100 yards at a speed of 45 m.p.h., and during its flight developed a speed of 90 m.p.h. with the engines throttled to 1,500 r.p.m. The balance proved to be perfect, and the ease of control, glide and landing exceeded the expectations of the designer. It landed at 40 m.p.h., and came to rest after a run of less than 200 ft. Only two private test flights had been carried out previous to this one, on the day before, each of about two minutes' duration.

The cabin, formed by the fore half of the fuselage, is com-

Longerons of solid spruce are used for the fuselage, from nose to tail post, with bolted-on tie wire fittings. A hard wood block, glued and screwed and finally covered with tape, is placed where the fittings fasten to the longerons. Fuselage truss wiring is made up of $\frac{3}{8}$ -in. 3 per cent. nickel steel rods, threaded right and left hand, and terminating in forks on each end.

The fuselage is covered with plywood from the nose to a point immediately at the rear of the luggage compartment



The Friesley
"Falcon" Cabin
Biplane: Side
view.

pletely enclosed, and contains twelve wicker seats, arranged in two rows in tandem, with a space of 20 ins. between each seat. As the cabin has a clear width of 4 ft. 8 ins., there is thus a wide aisle down the centre. There is plenty of room for the passengers to stand erect, the height of the cabin being 5 ft. 8 ins. The cabin may readily be adapted for freight or mail work, and there being no cross-bracing of any description a large clear space is provided. The pilot's cockpit is in the extreme nose, and as this portion of the cabin

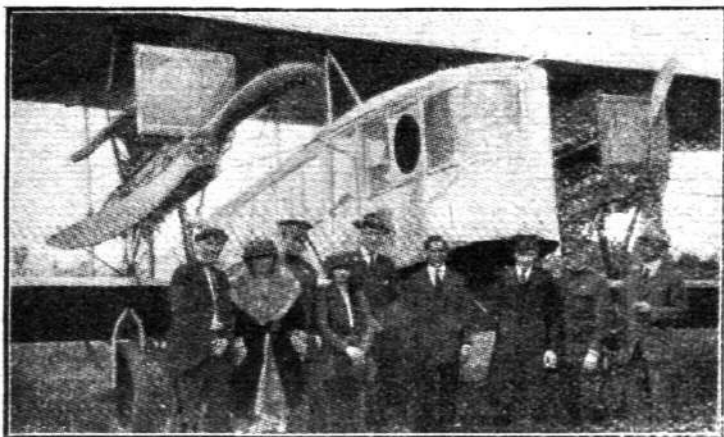
of the cabin, and from a point slightly forward of the tail skid to the stern post. The intermediate portion of the fuselage is covered with fabric. The tail skid is of steel tubing hung to a frame, also made of steel tubing, that fastens to all four longerons; the shock is taken by rubber cord.

One of the most unique features of construction in the "Falcon" is to be found in the rudder control. Instead of the conventional flapping wires running into the fuselage, the

The Friesley
"Falcon"
Cabin Biplane:
Three-quarter
front view.



control is conspicuous by its absence of exposed wires. Fastened to the rudder are short horns on which are pivoted two rods, which terminate in a semi-circular sliding yoke of steel tubing, that slides back and forth through a fitting mounted on the tail post. This yoke is actuated by the rudder control wires, which are completely enclosed. This allows a very clean-cut tail structure, and offers a minimum



THE FRIESLEY "FALCON" CABIN BIPLANE:
 Close up view, showing the 12-passenger cabin, and the two Liberty (low-compression) engines.

of resistance. The elevator control wires pass out of the tail and lead directly to the horns on the elevator—the total amount of exposed control wire being only about 2 ft. on each side. Rudders and ailerons are balanced. The stabiliser is adjustable by means of two screws controlled from the pilot's seat by a hand wheel.

Fuel is carried in tanks situated under the floor of the cabin, and is pumped from these to a gravity tank of 40 gals. capacity, located on the top plane above each engine. The overflow is fed back through sight gauges in the pilot's cockpit. The oil tanks are situated on the engine bearers immediately behind the engine.

The engines are 12-cyl. low-compression Libertys, mounted midway between the planes, somewhat forward of the leading edge, and driving Paragon tractor screws of 9 ft. diam. by 7 ft. pitch.

A substantial landing gear is fitted, consisting of the double-yoke type housing a pair of Atlas spring wheels, there being one unit immediately under each of the power plants. Elimination of shock absorber cord and of the weakness of construction where this is employed are the features of this under-carriage.

The principal characteristics of the "Falcon" are as follows:—

Span	65 ft. 3 ins.
Overall length	40 ft.
Overall height	15 ft.
Chord	7 ft. 6 ins.
Gap	7 ft. 6 ins.
Wing section	U.S.A. 5
Angle of incidence (top)	3°
Angle of incidence (bottom)	2°
Area of main planes	897 sq. ft.
Area of ailerons (4)	120 sq. ft.
Area of stabiliser	53 sq. ft.
Area of rudders (2)	33.2 sq. ft.
Area of fins	26 sq. ft.
Weight of machine empty	5,600 lbs.
Weight of machine loaded	8,600 lbs.
Weight, sq. ft.	9.3 lbs.
Weight, h.p.	12.3 lbs.
Speed range	55-120 m.p.h.
Climb to 5,000 ft.	4 mins.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A MEETING of the Committee was held on Wednesday, December 21, 1921, when there were present: Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S. (in the Chair), Wing-Comdr. W. D. Beatty, C.B.E., R.A.F., Mr. Ernest C. Bucknall, Col. F. Lindsay Lloyd, C.M.G., C.B.E., Lieut.-Col. F. K. McClean, Lieut.-Col. Alec Ogilvie, Mr. T. O. M. Sopwith, and H. E. Perrin, Secretary.

Election of Members.—The following new Member was elected: Christopher Rawson Mackenzie.

Racing Committee.—Reports of Meetings of Racing Committee held on November 28 and December 6, 1921, were received.

House Committee.—Report of Meeting of House Committee held on December 14, 1921, was received and adopted.

Finance Committee.—Reports of Meetings of Finance Committee held on December 14 and December 21, 1921, were received and adopted.

Flying Services Fund Committee.—Report of Meeting of Flying Services Fund Committee held on November 24, 1921, was received and adopted.

Air Conference, 1922.—The following were appointed to represent the Club at the Air Conference to be held in London in February, 1922:—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Lieut.-Col. F. K. McClean, Mr. T. O. M. Sopwith and H. E. Perrin.

Meeting of the Committee of the Fédération Aéronautique Internationale in Paris, January 9, 1922.—Lieut.-Col. M. O'Gorman was appointed to represent the Club at the Meeting of the Committee of the Fédération Aéronautique Internationale in Paris on January 9, 1922.

R.A.F. Memorial Windows in Jerusalem

IN St. George's Cathedral, Jerusalem, two memorial windows have been completed to the memory of a New Zealand officer, Lieut. T. L. Steele, R.A.F., who flew out over the enemy lines near Nablus on April 10, 1918, and was

British Record.—The following British Record was passed:—Class "C," No. 4 B. *Greatest Speed* over a straight-line course of 1 kilometre (Fédération Aéronautique Internationale):—

Type, Gloucestershire Mars I.
 Constructor, Gloucestershire Aircraft Co., Ltd., Cheltenham.
 Motor, 450 h.p. Napier "Lion."
 Pilot, J. H. James.
 Place, Martlesham Heath.
 Date, December 19, 1921.

Greatest speed (being the mean speed of four runs, in accordance with the regulations of the Fédération Aéronautique Internationale), 316.5 kilometres per hour (= 196.6 miles per hour).

Vacancy on Committee.—The acceptance by Wing-Commander W. D. Beatty of his appointment as Member of the Committee was reported.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

7918 Stanley Baker, March 31, 1917.
 7919 George Beacall Powell, December 8, 1921.

Custom Duties on Aircraft entering France.—It was reported to the Committee that the French Government had decided to levy duty on all British aircraft entering France after January 1, 1922.

The question of introducing the Tryptique having already been brought forward by the Club at the Conference of the Fédération Aéronautique Internationale in Madrid, it was decided to proceed with the negotiations through the Committee of the Fédération Aéronautique Internationale at its meeting in Paris on January 9, 1922.

never heard of again. The windows, given by his parents, were unveiled by Capt. Routh, R.A.F., and dedicated by the Bishop in Jerusalem, in the presence of Col.-Commandant Colville, Lieut.-Col. Ritchie and the men of the South Lancashire Regiment.

THE CURTISS MODEL CD-12 400 H.P. AERO ENGINE

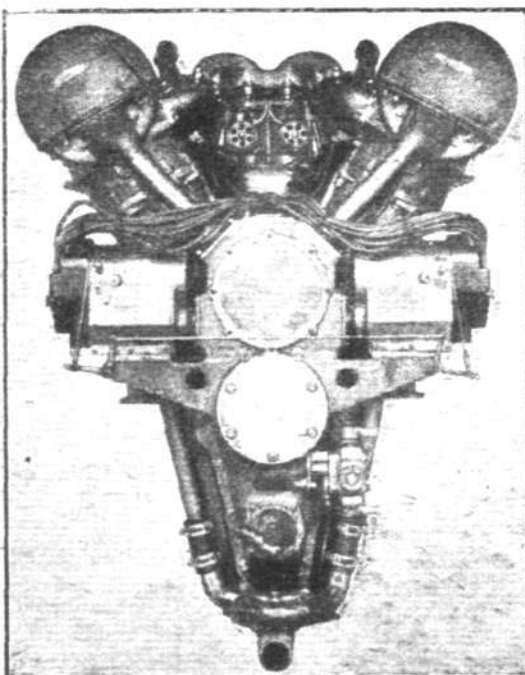
THE Curtiss model CD-12 400 h.p. aero engine is a development of the geared C-12 engine which made its first appearance four years ago, and which has, during that period, been subjected to thorough tests of various kinds. The CD-12, therefore, is not in any way an experimental model, but a production model. One of these engines was fitted to the Curtiss-Navy biplane which obtained first place in the second Pulitzer Race flown last November.

The CD-12, of which there are two types, a low-compression and a high-compression, is a 12-cylinder "V" with two rows of six cylinders set at 60°. The bore and stroke are 4½ ins. and 6 ins. respectively, and the engine has a total displacement of 1,145 cubic ins. The low-compression engine develops a b.m.e.p. of 137 lbs. per sq. in. in gauge, using high test fuel. With doped fuel the high-compression engine develops a b.m.e.p. of 143 lbs. per sq. in. The weight per b.h.p. comes out very low—2.27 lbs., including oil tank, water and radiator. In the low-compression model the b.h.p. at 2,000 r.p.m. is 385, and in the high-compression model at the same r.p.m. 405.

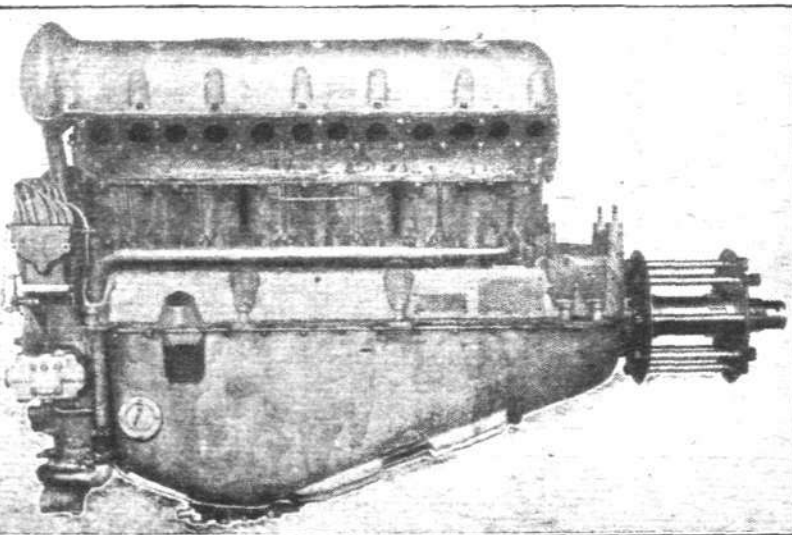
The general construction of the CD-12 is of the aluminium cylinder type, with inserted steel sleeves, and each cylinder is provided with two inlet and two exhaust valves, driven by overhead camshafts through bevel gears. The cylinder-head proper consists of an aluminium casting formed in one

strength and to dissipate heat. The ribs are arranged to allow even expansion from heat and to stiffen the pistons at the proper points. There are three rings per piston, the two upper rings being ½ in. wide and the lower ring ⅜ in.—all being above the gudgeon-pin. An oil-collecting groove is located directly below the lower ring with oil holes drilled through the piston walls, two of which lead into the gudgeon-pin. The latter floats in the piston and connecting rod, and is held in place from lengthwise motion by means of snap rings made of piano wire.

Inlet and exhaust valves are of the Tungsten steel tulip type, and are interchangeable. The cleared opening is 1½ in. in diameter, while the seat is ⅜ in. wide. These valves seat directly in the steel cylinder head. The valve guides are made of cast iron pressed into the aluminium cylinder head, and need not be removed unless a replacement is desired. The camshafts are mounted on the top of the cylinder head on six aluminium brackets, the shafts running directly in the aluminium. There are separate intake and exhaust shafts, the intake shaft being driven from the exhaust shaft by means of spur gears. One cam operates two valves on each cylinder through a T-shaped tappet which works in a bushed hole in the cylinder head, and which removes all side thrust from the valve stems, giving an almost unlimited life to the valve guides themselves, as well as allowing the valves to seat



Two views of the Curtiss CD-12 aero engine, a 12-cyl. "V" of 400 h.p.



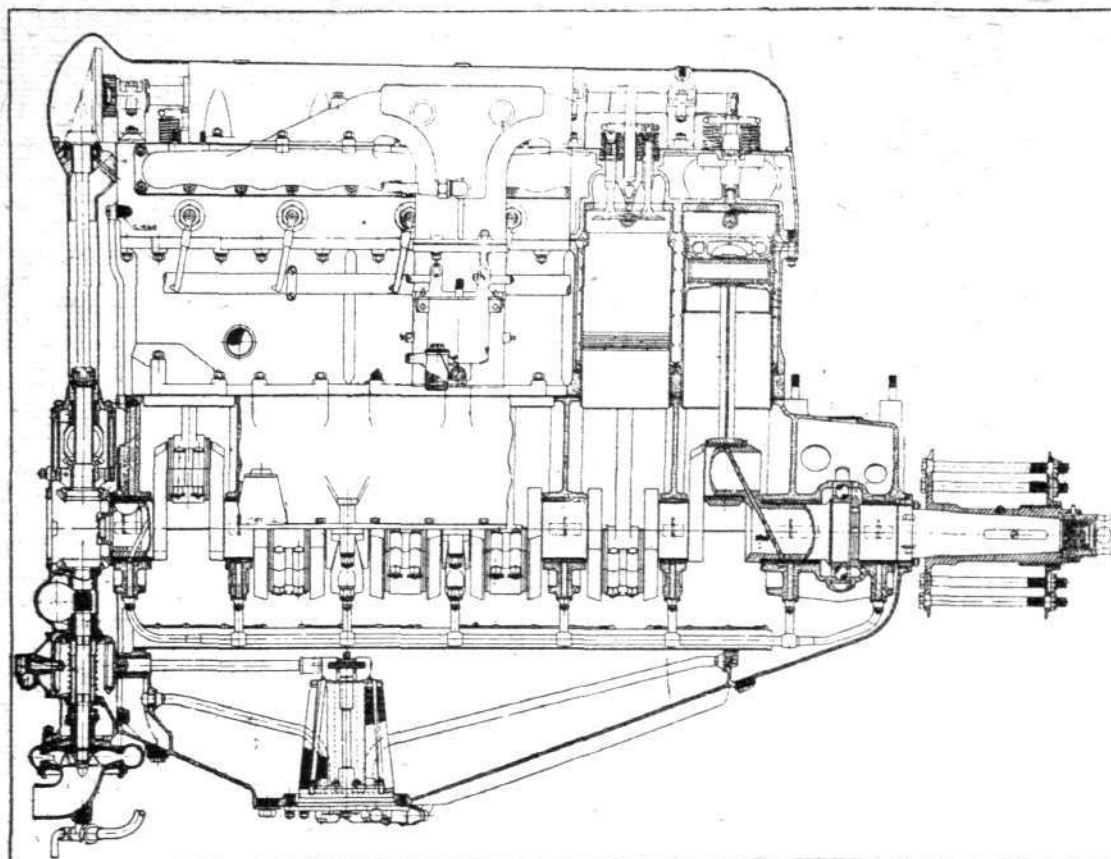
piece to take six separate sleeves. These sleeves are made of high carbon steel of hydraulic forgings, which are rough-machined, heat-treated and then machine-finished, with the exception of the final grinding of the bore, before assembly in the cylinder head. The sleeves are threaded at the closed end for a distance of 1½ in. At the lower end a gasket flange is formed, and on the outside of the barrel several stiffening flanges are located approximately 1 in. apart. An integral stud is formed on the closed end of the sleeve which passes through the water-jacket of the cylinder head after the sleeve has been screwed into the head, and a nut on this stud draws the closed end of the sleeve into perfect contact with the aluminium cylinder head. After the sleeves are in place the valve holes are bored and seated, being correctly placed and aligned with the proper fixtures. Brass bushings are inserted through the side of the head for the sparking-plugs, these bushings being tapered on the outside to ensure a tight joint. The water-jacket consists of a one-piece aluminium casting which slips over the lower end of the six sleeves. In order to make a water-tight joint at the lower end of this jacket, a composition gasket material, which resists the action of hot water, petrol and oil, is used. The upper joint, which is made between the jacket and the cylinder head with studs and nuts, is made tight with a copper asbestos gasket. The lower end of the water-jacket is constructed with proper bosses for holding the complete cylinder-head assembly to the crank-case, thereby forming a unit which is both compact and accessible for overhauling or inspection.

The pistons are made of an aluminium alloy, and are of the trunk type, carefully ribbed under the head to obtain

perfectly. The valves are adjusted by a screw in the ends of the T tappets.

The crankshaft is of the conventional seven-bearing type, being made of 35-45 carbon-chrome nickel steel. The drop-forgings are heat-treated and then machine-finished. The crankshaft has an outboard bearing beyond the propeller thrust bearing, thereby giving a very long support at the propeller end of the engine. The crank-pins are 2½ ins. in diameter and 2½ ins. long. The main bearings are all 3 ins. in diameter, and vary in length from 1 in. to 3 ins. A bevel gear is bolted to the anti-propeller end of the crankshaft to drive all the accessories and camshafts. The propeller end of the crankshaft carries a 1-10 taper, fitted with a key for driving the propeller hub. The thrust bearing, which is mounted between No. 7 and No. 8 main bearings, consists of a deep-grooved radial annular bearing, which takes the thrust in either direction.

The upper half of the crank-case is cast from an aluminium alloy, and the bearings supporting the crankshaft are in single diaphragms strongly ribbed to the case. Bearing caps are used to form the other half of the bearings, and are of I-beam section. Each cap is fastened to the case with four studs fitted with castellated nuts. A large keyway is cut in the cap and crank-case, to prevent the former from shifting its position on the case when the engine is running. The bearings of the crank-case are fitted with bronze-backed babbet-lined bearing shells, which are held in place with countersunk-head brass screws. These latter hold the bearings in place, and also provide a better contact between the shell and the aluminium crank-case. The lower half of the crank-case is



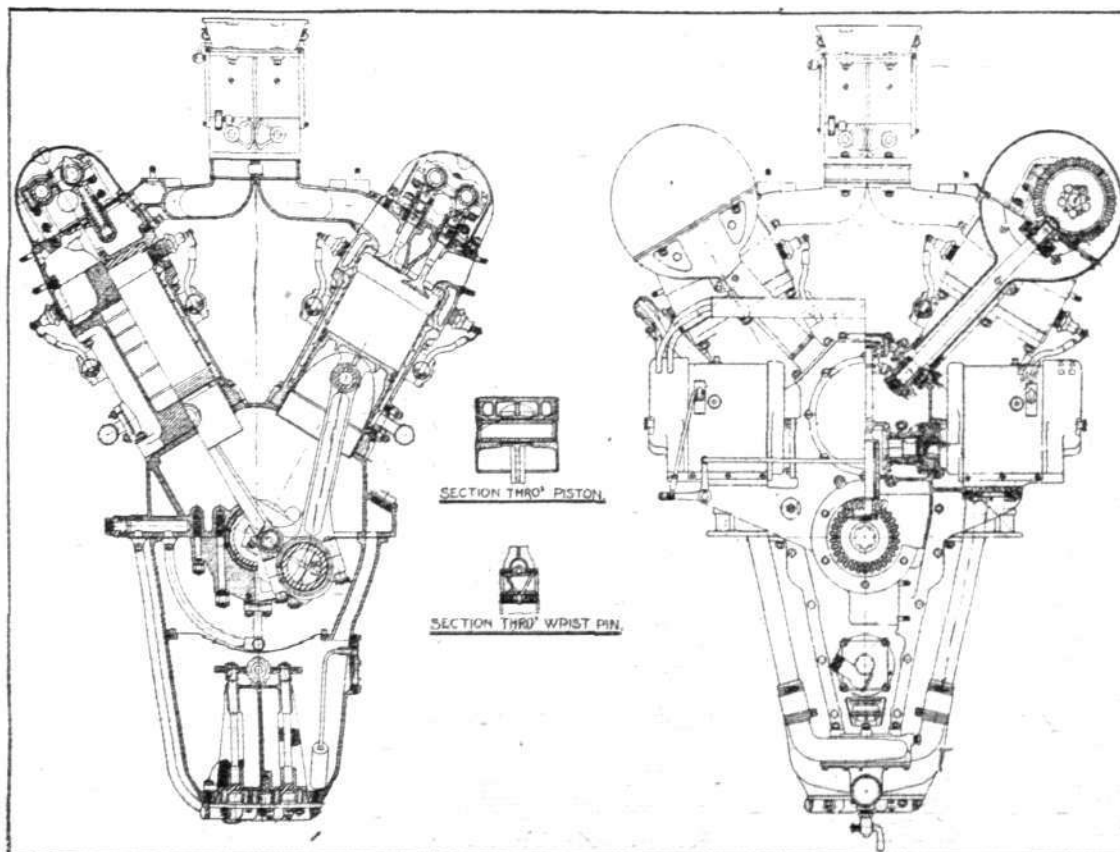
Side elevation, in part section, of the Curtiss C-6, 6-cyl. aero engine, which is similar in general detail to the CD-12.

flanged and bolted to the upper half at the centre line of the crankshaft. This case carries the oil-pump drive shaft and the oil reservoir, which is separated from the crank-chamber by a sheet-aluminium partition. The suction pumps are piped to each end of the case into small sumps, so that the crank-case cannot be flooded when the engine is out of normal position. An oil gauge of the cork-float type, with a dial on the outside of the crank-case, is fitted. On the anti-propeller end of the engine is mounted a casting which carries all the shafts necessary for driving the oil pump, water pump, revolution counter, electric starter, magnetos, generator, synchronisers and camshaft drive-shafts. This assembly consists of one unit and can be removed as such. All shafts and gears are put together with stud-toothed splines. The camshafts are driven through two drive-shafts by mitre gears. This is made possible by the use of a short vertical

shaft extending from the crankshaft up to the point where lines from the exhaust camshafts form the proper angle for mitre gears. The generator drive is taken off the top of this vertical shaft, and the synchroniser drives are taken from the two camshaft drive-shafts by forming bevel gears on these shafts at approximately their centre. The tachometer drive is taken from a lower vertical shaft from bevel gears. This lower vertical shaft drives a water pump through a squared floating coupling, and also drives the oil pump through bevel and helical gearing, which is mounted on the top of the oil pump. A pad is formed on the gear-case to take the Bijur starter, which was developed for the Liberty engine. The magnetos are driven through flexible couplings and bevel gears from the upper vertical shaft. All the shafts in this gear-case run at one and a half crankshaft speed.

Connecting rods are of I-beam section of the articulated

Sectional end elevations of the Curtiss C-12 aero engine, which varies but slightly from the CD-12.



type. The master rod is always assembled in the left-hand side of the engine when the crankshaft is turning clockwise, so that the maximum pressure on the small rod will come in a line through its gudgeon-pin hole, wrist-pin hole and the crank-pin centre. These rods are steel drop-forgings, heat-treated and finished all over. The upper bushing is "non-gran" bronze, and the lower bushing is bronze-backed babbet, which is riveted in the rod and cap with brass rivets. The lower end of the small rod is forked, and carries two non-gran bronze bushes. Two 52-mm. Duplex Ball and Ball carburettors are fitted. Each venturi tube feeds three cylinders through a fan-shaped manifold, which is open to the three cylinders and carburettor without partitions. The two carburettor air intakes are interconnected with sheet-aluminium conduits, which can be led to the outside of the fuselage.

Ignition is furnished by two high-tension single-spark, 12-cylinder magnetos of the polar inductor type, driven through flexible couplings from the vertical shaft. There are two sparking-plugs per cylinder, connected to the magnetos by cables enclosed in aluminium tubes. The plugs are located at right angles to the centre line of the block and diametrically opposite. One magneto is wired to the "exhaust" plugs, and the other to the "inlet" plugs. These magnetos are equipped with a special switch which gives battery excitation for starting when the magnetos are fully retarded.

The cooling water is circulated by means of a centrifugal pump located at the lower end of the lower vertical shaft. This pump is of the double shrouded type, having an aluminium impeller with the intake on the lower side. Water is drawn from the radiators, entering the pump through the cover, and, after being discharged from the pump, is directed to the lower end of the water-jacket in each cylinder through tapered manifolds. The water surrounds the cylinder sleeves, and enters the cylinder heads through holes drilled in the latter, and circulates around the ports and passes out at a point between the valves on each cylinder into a tapered manifold. From this manifold the water passes back to the radiator. The water pump is equipped with a deep-grooved radial bearing, which takes the thrust of the rotor caused by the suction of the water pump. It is also provided with a suitable stuffing gland to prevent leakage.

Lubrication is by pressure feed from an oil pump located in the lower half of the crank-case and driven as previously described. The gear pump forces oil into a manifold, which directs the oil into the bottom of each main bearing. The main journals in the crankshaft are plugged, and receive oil through three equally-spaced holes in the journal. The oil then travels through a tube inserted from the journal to the crank-pin in the connecting-rod bearing. Tubes are also fitted in the articulated wrist-pin to carry oil from the connecting-rod bearings to the bearings in the small connecting rod. The cylinder walls and wrist-pins are lubricated by splash, whilst the upper vertical shaft is fed by pressure from a duct leading from the first main bearing. Oil is piped from the anti-propeller end of the crank-case from the last-mentioned duct to the camshafts through the foot of the first camshaft bearing. Each camshaft is drilled at each bearing, so that oil may find its way into the inside of the hollow camshafts, allowing oil to lubricate each camshaft bearing under pressure. The camshaft bearings do not receive the full oil pressure, as the holes in the first crankshaft main

journal are so arranged that the camshafts receive index-feeding twice per revolution of the crankshaft. Oil from the camshaft bearing drains back into the front sump through the camshaft drive-shaft housings to the front gear-case, and lubricates the ball bearings which carry the camshaft drive-shafts. It also lubricates the lower vertical shaft, which is carried in two bronze bushings surrounded by a pocket of oil. The oil from the connecting-rod bearings and main bearings is drained into the front and rear sumps, to be drawn into the suction pumps through tubes connecting the pump with either end of the engine. The suction pumps then force oil into the oil reservoir below the oil partition. The pressure pump draws the oil through a truncated cone screen, thereby ensuring clean oil to be forced into the main bearings. A pressure-regulating adjustment is provided on the cover of the oil pump. This cover is also arranged for connecting an oil cooler in series with the outlet of the suction pump.

The petrol system which is used in the high-speed 'planes equipped with the CD-12 engine is laid out as follows:—A double opposed petrol pump, which is driven through worm gearing at approximately one-tenth of the vertical drive-shaft speed, and operates the pistons by means of a cam working in a slot in the connecting rod between the two pistons. This arrangement provides a crank-case in the pump which has a constant volume when the two pistons are reciprocating. Oil under pressure is supplied to this crank-case, and a suitable relief valve is provided to maintain a predetermined pressure. This oil pressure seals the pistons against petrol leakage, and lubricates the piston walls. The pump forces petrol to the carburettors, a small header tank being put in the line to dampen out pulsations. A relief valve is placed in the line to maintain a constant pressure to the carburettors. This relief valve overflows to the main tank.

The principal characteristics of the CD-12 are as follows:—

		Low comp.	High comp.
Rated h.p.	.. .. .	375	400
Normal r.p.m.	.. .. .	2,000	2,000
B.h.p.	.. .. .	385	405
Comp. ratio	.. .. .	5.7	6.1
Weight, dry	.. .. .	Lbs. 700	
" with oil tank, water and radiator	.. .. .	922	
		Low comp.	High comp.
		Lbs.	Lbs.
" per b.h.p., dry	.. .. .	1.82	1.75
" " with oil tank, etc.	.. .. .	2.4	2.27
Petrol consump., lbs./hr.	.. .. .	192.5	202.5
" " b.h.p./hr.	.. .. .	0.5	0.5
Oil consump., lbs./hr.	.. .. .	3.00	3.24
" " b.h.p./hr.	.. .. .	0.008	0.008
Bore	.. .. .	Ins. 4½	
Stroke	.. .. .	6	
		Ft.	Ins.
Overall length	.. .. .	4	8½
" width	.. .. .	2	4½
" height	.. .. .	2	11



Married

On December 22, at St. Woollos, Newport, HENRY WOLFERSTAN BECK, R.A.F., was married to MATILDA GENEVIEVE LYNE.

On December 6, at Littleham Church, Exmouth, G. T. W. BURKETT, M.C. (formerly Australian Artillery and Lieut. R.A.F.), only son of Mr. G. Burkett and Mrs. Burkett, of Melbourne, Australia, was married to ADELAIDE HENRIETTA, elder daughter of Rev. F. W. Tracy and Mrs. Tracy, of 14, Morton Crescent, Exmouth.

Major HEReward DE HAVILLAND, D.S.O., M.C., third son of the late Rev. C. M. de Havilland, Rector of Crux Easton, was married at the Embassy Chapel, Madrid, on December 9, to MARY PROCTOR SWABY, only child of Mrs. J. de Solla, of Madrid, and the late Dr. William Percy Swaby.

The marriage took place at St. Augustine's Church,

Johannesburg, on December 13, of SYDNEY MACKENZIE SPROAT and GLADYS MARY MEESON.

To be Married

The engagement is announced of ANTHONY CONNING KILBURN, late R.A.F., of Murrah Hall, Troutbeck, Cumberland, youngest son of Mr. and Mrs. C. Conning Kilburn, of Broadstone, Dorset, formerly of Calcutta, and MAUD, eldest daughter of Mr. and Mrs. C. TOPPIN, of The College, Malvern.

Deaths

ANTHONY PEER GROVES, second son of Margery and William Peer Groves, R.A.F., of 2, Chester Gate, London, N.W. 1, and Salford, died on December 17, from pneumonia.

LESLIE GRONOW WOOD, Flying Officer, R.A.F. ("SPLINTER"), second son of Dr. and Mrs. A. T. Wood, died on December 19, of illness contracted in Egypt.

THE NEW ROYAL AIR FORCE CLUB

DURING the War Lord Cowdray promised to give to the R.A.F. a Club-house, furnished and equipped complete, and that promise has been more than fulfilled in a magnificent building known as No. 128, Piccadilly, which was opened as the Royal Air Force Club on Monday, and which, including leases, represents a gift of £345,000. A preliminary view of the buildings was accorded to representatives of the Press on Saturday last, and at the following luncheon Brig.-Gen. More, Chairman of Committee, read a telegram from Lord Cowdray regretting his inability to be present, and concluding: "I shall be gravely disappointed if you do not find it in every way worthy of the Air Force, to which it is dedicated as a tribute. I have given it with thankfulness and pride." The Club-house consists of the two houses lately occupied by the Ladies' Lyceum Club, and also a large new building on Milton's Yard. The Lyceum Club building has been largely remodelled and an additional floor of bedrooms added to it, while the building on Milton's Yard used as a riding-school was demolished to make room for the new building, which has been designed as an extension of the Piccadilly building. It is interesting in this connection to note that during the building operations several pewter tankards of the eighteenth century were dug up bearing the inscription "The Running Horse"—probably one of the old coaching houses—and these are now on view in the hall of the new Club today.

Building operations commenced on September 8, 1919, and were confined at first to reconstructing the Piccadilly building with a view to its occupation in the summer of 1920, but in the meantime the negotiations for a long lease of Milton's Yard matured, and Lord Cowdray decided to complete the whole building forthwith. The work was continued as far as possible on the portion that had been started, while final plans were prepared for the new additions on Milton's Yard.

After many difficulties of rights-of-light, strikes, high prices and other troubles on that account, the new buildings were begun in the early part of 1921, and under the contract are due to finish on January 31, 1922.

If the planning of these buildings differs from that of other club buildings, it is in an attempt to meet the modern requirements of club members, who, in addition to the ordinary privileges of a London club, desire some of the additional

advantages of an hotel, and also some facilities for taking exercise. To this end the Piccadilly portion of the building is entirely devoted to club life, with access from the main entrance in Piccadilly to the large dining, smoking, writing, billiard, card and other club rooms. The large dining-room on the Piccadilly front, extending over the whole length of the building, with a magnificent view over the park, is one of the attractions of this part of the Club.

In Park Lane there is a separate entrance for the use of members living in the Club or arriving with luggage, and close to this is a bureau, telephones, secretary's office, etc., where the business work of the Club is carried on. From this entrance a large ballroom on the first floor, the ladies' section of the Club, and two squash racquets courts are reached, so arranged that they may be used without interfering in any way with the members' club-rooms in the front of the building, but connected on the principal floors for convenience of access by the main corridors, which have been treated by the architects—Sir Aston Webb and Sons—to form an architectural feature of the building. On the upper floors, in addition to 70 members' bedrooms, with a full complement of bathrooms, a suite of rooms for private dinner parties, a barber's shop and men-servants' accommodation have been provided, reached by electric lifts and staircases from both the Piccadilly and Park Lane sections of the building.

Great care has been bestowed on the kitchen and service arrangements generally, which are very complete and up to date, as the successful working of a club of this kind depends very largely on the care and thought given to the service arrangements; and also the comfort of the Club's servants, who here have their proper share of comfortable recreation rooms, dining-rooms and sleeping accommodation.

The new parts of the building are fireproof throughout, and the whole is equipped with low-pressure heating, electric light and power, electric clocks, lifts, vacuum cleaners and a complete telephone installation. Refrigerating plant for ice-making and storage is also included in the equipment.

Messrs. Trollope and Colls are the general contractors, and they have also made the furniture for the public rooms.

The subscription to the Club is ten guineas for town members, seven guineas for country members and two guineas for foreign members.

LONDON TERMINAL AERODROME

Monday Evening, January 2, 1922.

THE aerodrome presented a busy scene—almost, indeed, like the height of summer—when a delegation of Japanese trade representatives paid us a visit on Saturday. A dozen cars were drawn up on the tarmac outside the Customs' House, and the Air Ministry was strongly represented.

General Sykes, General Festing, and members of the various branches of the Civil Department at the Ministry were present, pointing out to the visitors the many features of the aerodrome. Great interest was shown in the control tower, and a temporary ladder had been erected for the visitors to ascend into the hut on top. The ordinary cat-ladder was apparently considered too precarious, though the Japanese are always reckoned an agile race. The various Air Ministry machines were lined up for inspection, and the Handley Page W.8, and the Instone Air Line's Vickers-Vimy, were busy taking members of the delegation for joy-rides. The ease with which the W.8 gets off, and the machine's rapid climb, were the subject of much comment.

The staffs of the French firms are taking advantage of the winter dearth of business to visit their native land. M. Didier, for instance, has just returned from France, and assures me he has had a thoroughly good time.

London to Algiers by Air

M. DIDIER was able, incidentally, to give me some new details as to the Messageries Aériennes' proposed service from London to Marseilles. The company intends to use the new four-engined Spads on this service. The usual summer 9.30 a.m. Messageries machine from London to Paris will carry passengers for Marseilles over this section of the route, arriving in Paris at 11 a.m. A halt will be made at Le Bourget for lunch, after which the voyagers will embark in a new 16-seater Spad and fly to Lyons, where they will be timed to arrive at 3 p.m. Then, continuing to Marseilles, they will alight there at 5.30 p.m. It is hoped to arrange for the new airship service, running between Marseilles and Algiers, to connect at Marseilles with the aeroplane from London, thus making it possible to travel from London to Algiers in less than 24 hours.

On Tuesday last Handley Page Transport, in conjunction with the Victoria Hotel, put up a good advertising "stunt." A Christmas-tree was fitted in the fore-part of the cabin of one of their machines, and gaily decorated. A hamper, containing a full-course Christmas dinner, including turkey, was sent down to the aerodrome on the passenger-car from the Victoria Hotel, and a waiter in evening-dress—who was, by the way, a former Handley Page observer—travelled in the machine and served dinner to the passengers and pilot while *en route*.

"Air Expresses" in a Gale

On Friday last, with a terrific gale raging, Mr. R. H. MacIntosh made another of his wonderful bad-weather flights. Two machines, both Handley Page 0-400's, left Paris together, and made good time with the wind behind them as far as the French coast. Here they were caught by the full force of the Channel gale, which was blowing at a speed of somewhere in the eighties at the height the machines were flying. Mr. Wilcockson managed to land at the Berck aerodrome, but, after his passengers had alighted, and before anything could be done to the machine in the way of protecting it from the gale, it was caught broadside-on and lifted up on to one wing and then on to the other, being wrecked badly.

Mr. MacIntosh, who was just about to land, saw the accident, and decided it would be safer to carry on to Croydon, where there would be a proper staff to handle his machine. Although quite low down, and within a few hundred feet of the houses in the village of Berck, he put his engines full on and the machine rose straight into the air for about 3,000 ft. He had a tremendous fight to get across the Channel. At times both he and his mechanic had to hang on to the controls, and when he finally landed at Croydon, only managing to escape a crash by fine piloting, he had been 4 hours 35 minutes on the journey from Paris.

The Instone Air Line are erecting a new office in front of their original small office. This is, I understand, to be used as a parcels dépôt, and is being got ready for the time when the new "goods only" machines begin running.

CIVIL AVIATION IN 1921

Half-Yearly Report of C.G.C.A.

[THE half-yearly report on the progress of Civil Aviation during the period April-September, 1921, was issued as a White Paper (Command No. 1559) on December 23. As usual it is signed by Sir Frederick Sykes, Controller-General of Civil Aviation, and contains statistics and other interesting data relating to the progress made all over the world during the period under review (April 1 to September 30, 1921). The report, which is obtainable from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, price 3s. net, is far too lengthy to publish in full, and we therefore propose to deal with only such portions of it as can be usefully reviewed and summarised. We thoroughly recommend all who are interested in aviation in any of its branches and applications to obtain a copy, and thus to be able to follow in detail the subjects and statements to which only the briefest reference can be made here.—ED.]

The fifth half-yearly report on the progress of Civil Aviation at home and abroad follows the lines of previous reports. Part I includes information regarding civil aviation in Great Britain and the Empire, and Part II its progress in foreign countries. In dealing with the question of relations with foreign countries, the report states that ratifications of the International Air Convention have been prepared by the British Empire, France, Japan, Belgium, the Serb-Croat-Slovene Kingdom, Greece, Portugal and Siam. Under Article 34 of the Convention ratification by a majority of the 26 signatory States (the British Empire counting for this purpose as six) is required before the International Commission for Air Navigation can be constituted. The ratification of only one more State is required before this can be done. The periodical Conferences between the Department of Civil Aviation and the French and Belgian Air authorities have been continued with, it is stated, satisfactory results.

The regulations adopted in 1919, which were based upon the principle that the owner of an aircraft should be responsible for the safety of the machine (the system of supervision by licensed ground engineers), are considered to have proved satisfactory. It is of interest to find it stated that negotiations are in progress with a view to establishing somewhat similar procedure in the case of foreign aircraft operating to and from England. Other countries have not as yet paid the same attention to the subject of maintenance.

Attention is called in the report to certain progressive improvements at Croydon, notably with regard to medical examination of alien passengers, and to the installation of bulk petrol storage and the establishment of a sub-post office.

In the matter of communications (Signals and navigation) progress has been made with direction-finding wireless, and it is stated that now that both Pulham and Croydon have been provided with stations working in conjunction, it is possible for aircraft to "fix" their position by bearings obtained simultaneously from the two stations. The radio-telephonic service with aircraft has been further developed. All British machines employed on the cross-Channel services carry telephones, and as soon as the ratification of the International Air Convention has been deposited, regulations will be issued which will make it compulsory for aircraft carrying ten or more passengers to be equipped with wireless.

Largely as a result of the experimental flights of "R.33," arrangements are now in course of completion whereby the Croydon-Lympne route could at short notice be opened for night flying.

Progress has been made in the compilation of data regarding aviation facilities in foreign countries, and records have been prepared showing existing facilities in a number of European countries. A gazetteer of the facilities in the British Isles is nearing completion.

Commercial Air Services

Apart from the statistics contained in tables at the end of the report, reference is made to the operation of the London-Paris air services under the temporary subsidy scheme entered into with the Handley Page and Instone companies. The services have been in operation throughout the summer of 1921 with, the report states, satisfactory results. It is pointed out that few machines of an improved economical commercial type were available, and that the temporary nature of the arrangement rendered it financially impracticable to provide large numbers of machines. In spite of these handicaps, there was a considerable increase in the average load carried per flight.

Reference is then made to the proposed "permanent" scheme of subsidy on a 25 per cent. basis and including the hire-purchase scheme by which firms are able to acquire machines of "approved" type at less than cost price. The report states, however, that by August 1, the date on which the scheme was to come into force, the experience gained during the summer had shown that the scheme as originally proposed was not likely to provide adequate assistance, and it was therefore amplified as follows: "An additional grant of £3 per passenger and 3d. per lb. of freight will be made to approved firms during the year ending February 28, 1923, while in addition a contribution towards the insurance of machines provided by the Air Ministry under the hire-purchase system will be made in the form of 50 per cent. of the premiums up to a maximum of 10 per cent. of the value of the machines. This scheme, it is hoped, will become operative in March, 1922; meanwhile, special arrangements, similar to those now obtaining, are being continued for the operation of the London-Paris service during the winter months 1921-22."

The report states that, as it is considered that it would not be desirable to have unlimited competition, the number of firms has, for the time being, been limited to four. Of these, the Handley Page, the Instone and the Daimler Hire have been chosen to operate the London-Paris route, while one firm only, the Aerial Route Syndicate, Ltd., has been selected to run a London-Brussels service. It is stated that the Air Council do not contemplate approving more than three firms at any one time on the London-Paris route, although reserving the right to approve other firms should circumstances warrant it.

Some interesting information relating to developments in meteorology is given in the report, but we would refer those interested in this important branch to obtain the White Paper so as to derive the advantage of the complete report.

As regards licences and certificates, it is of interest to quote a few figures. During the period under review, 118 pilots' licences were renewed, 122 ground engineers, 104 certificates of registration of heavier-than-air machines and 4 lighter than air, and 45 airworthiness certificates for heavier-than-air craft. The corresponding numbers of new licences and certificates were as follows:—Pilots, 52; ground engineers, 38; heavier-than-air craft, 76; lighter-than-air craft, 2. Airworthiness certificates for heavier-than-air craft, 57.

It is interesting to note that a special certificate of airworthiness for racing machines has been approved, as such machines would be severely handicapped by having to conform to the rules applying to commercial machines.

Collection, Collation and Issue of Information.—With regard to the well-known "Notices to Airmen" (which are published in FLIGHT regularly), it is proposed in the future to make a slight modification in the manner of issue. Although numbered consecutively in the order of issue, they will appear under two heads—(a) Navigational and (b) General. In addition it is intended to issue a *Monthly Air Pilot* containing reprints of the Notices to Airmen, as well as other, and less urgent, information. The issue of an *Annual Air Pilot* is under consideration.

Airships.—On this delicate subject the report contains a brief statement of the facts which led to the suspension of all airship activity and the reduction of the personnel to care and maintenance parties. Reference is also made to various experiments made with airships during the period under review, notably experiments with mooring.

Regarding the progress of civil aviation in the Dominions, Colonies and foreign countries, the report contains some very interesting and valuable information, but we have not the space to refer to it at length here. Some of the numerous tables of data and statistics contained in the report and its appendices are, however, of interest.

For instance, the number of arrivals and departures of aircraft from and to the Continent between April and September, according to nationality, were as follows: British, 671; French, 1,058; Belgian, 339; Dutch, 292. The number of passengers carried on the same routes during the same period by machines of the different nationalities were: British, 4,006; French, 3,499; Belgian, 597; and Dutch, 420.

The total value of the imports (free and dutiable) by air from April to September was £206,357, and that of the exports was £110,400. The estimated number of outgoing letters posted for transmission by air was 42,840, and the

number of incoming letters 38,696. The average efficiency of the outward air mail services was: On the London-Paris route, 95 per cent.; London-Brussels, 70 per cent.; London-Amsterdam, 89 per cent.

During the period under review (six months) there were two accidents resulting in the death of one or more occupants, two resulting in injury to occupants and six not involving injury to personnel, or a total of 10 accidents. The number of machine miles per flying accident was 32,200; the number of machine flights per flying accident, 1,718. Machine hours flown per accident, 415. Passengers killed per 1,000 carried,

0.03, and passengers injured per 1,000 carried, 0.03. These figures speak well for the safety of modern flying, and as they show a considerable decrease in accidents as compared with the corresponding period of last year, it may be assumed that as machines and organisation improved the percentage, small as it is, will be still further reduced.

An appendix by the Department of Civil Aviation states the case for civil aviation with remarkable clearness and without taking in any instance an exaggerated view of the service which aviation can and should render to humanity.

NEW YEAR HONOURS

THE following appears in the New Year Honours list:—The King has been pleased to give orders for the following promotions in and appointments to the Order of the Bath:—

K.C.B. (Military Division)

FELL, Group-Capt. (acting Air-Commodore) MATTHEW HENRY GREGSON, C.B., C.M.G., R.A.F. Med. Serv.

C.B. (Military Division)

BORTON, Group-Capt. AMYAS EDEN, C.M.G., D.S.O., A.F.C., R.A.F.

C.B. (Civil Division)

SMITH, WILLIAM SYDNEY, Esq., O.B.E., Superintendent of the Royal Aircraft Establishment, South Farnborough.

It is announced that the honour of Knighthood has been conferred upon Mr. A. S. Mays-Smith, President of the Society of Motor Manufacturers and Traders, and that Mr. Wm. M. Letts, C.B.E., has been promoted to Knight Commander (K.B.E.) of the Order of the British Empire, for public services. It may be added that Mr. W. M. Letts is Managing Director of Messrs. A. V. Roe and Co., Ltd.

AWARDS AND PROMOTIONS

The Air Ministry announces that the King has been pleased to approve of the following awards to officers of the Royal Air Force:—

Second Bar to the Air Force Cross.—Sqdn.-Leader William Ronald Read, M.C., D.F.C., A.F.C. (Capt., Dragoon Guards).

Bar to the Air Force Cross.—Sqdn.-Leader Roderic Maxwell Hill, M.C., A.F.C.

The Air Force Cross.—Flight-Lieut. Augustus Henry Orlebar, Flight-Lieut. David Arthur Stewart, M.C., D.F.C., Flying Officer Sidney Norman Webster.

Promotions

The following officers are promoted to the ranks stated, with effect from January 1:—

General List

Air-Commodore to be Air Vice-Marshal.—Philip Woolcott Game, C.B., D.S.O.

Group-Captains to be Air-Commodores.—Hugh Caswall Tremenheere Dowding, C.M.G., Bertie Clephane Hawley Drew, C.M.G., C.B.E., Charles Rumney Samson, C.M.G., D.S.O., A.F.C., Robert Hamilton Clark Hall, C.M.G., D.S.O.

Wing-Commanders to be Group-Captains.—Alfred Drummond Warrington-Morris, C.M.G., O.B.E., Norman Duckworth Kerr MacEwen, C.M.G., D.S.O., Hon. John David Boyle, C.B.E., D.S.O., Edward Featherstone Briggs, D.S.O., O.B.E., Peregrine Forbes Morant Fellowes, D.S.O.

Squadron-Leaders to be Wing-Commanders.—Dermott Lang Allen, A.F.C., Charles Humphrey Kingsman Edmonds, D.S.O., O.B.E., Richard Edmund Charles Peirse, D.S.O., A.F.C., Reynell Henry Verney, O.B.E., Thomas O'Brien Hubbard, M.C., A.F.C., Lawrence Arthur Pattinson, D.S.O., M.C., D.F.C., Hazelton Robson Nicholl, O.B.E., Arthur Thomas Whitelock, Robert John Ferguson Barton, O.B.E., William Lawrie Welsh, D.S.C., A.F.C., Hugh Lambert Reilly, D.S.O.

Flight-Lieutenants to be Squadron-Leaders.—William Bowen

Hargrave, O.B.E., Hugh Vernon Champion de Crespigny, M.C., D.F.C., Ivor Thomas Lloyd, Eric John Hodson, Raymond Collishaw, D.S.O., O.B.E., D.S.C., D.F.C., Cyril Gordon Burge, O.B.E., Francis William Henry Lerwill, O.B.E., Charles Henry Elliott-Smith, A.F.C., Charles Oscar Frithiof Modin, D.S.C., Sir Christopher Joseph Quinton Brand, K.B.E., D.S.O., M.C., D.F.C.

Flying Officers to be Flight-Lieutenants.—Herbert Martin Massey, M.C., Geoffrey Arthur Henzell Pidcock, Cecil Alfred Stevens, M.C., Walter Travis Swire Williams, D.S.C., Samuel Marcus Kinhead, D.S.O., D.S.C., D.F.C., Seymour Stewart Benson, A.F.C., Edward Derek Davis, Peter Cundle Wood, Robert Allingham George, M.C., Frederick McBean Paul, Allen Robert Churchman, D.F.C., Bernard McEntegart, Peter Warburton, M.B.E., Frank Gerald Craven Weare, M.C., William Edmund Somervell, Alfred Conrad Collier, Kenneth Buchanan Lloyd, A.F.C., George Thomas Richardson, Maurice Henry Butler, D.F.C., William Geoffrey Meggitt, M.C., Eric John Webster, D.F.C., Herbert Edwin Tansley, M.C., Ian Cullen, A.F.C., George Cecil Gardiner, D.F.C., Arthur Vincent Howard Gompertz, Maurice Moore, Arthur Francis Quinlan, Percy John Barnett, M.C., Sydney Edward Toomer, D.F.C., Leslie Norman Hollinghurst, D.F.C., Clement Flegg Horsley, M.C., Charles Basil Slater Spackman, D.F.C., Ernest Lionel Ardley, Richard Michael Trevelyan, M.C., Neville Byron Ward, Edward Reginald Openshaw, Reginald Thomas Brooke Houghton, A.F.C., Ralph Myddleton Banks-Jones, James John Williamson, A.F.C., Owen Washington de Putron, Robert Hugh Hanmer, M.C., Victor Hubert Tait, James Matthews McEntegart, Robert William Edwards, James Alexander Gordon Haslam, M.C., D.F.C., Kenneth Lloyd Harris, Albert Grounds Peace, A.F.C., William Conway Day, M.C.

Stores List

Squadron-Leader to be Wing-Commander.—Walter John Dakins Pryce, O.B.E., D.C.M.

Flight-Lieutenants to be Squadron-Leaders.—William Boston Cushion, Eric Rivers-Smith, M.B.E., James Ambrose Stone, William Henry George Maton, M.B.E.

Flying Officers to be Flight-Lieutenants.—Arthur Benjamin Wiggin, William Arthur Kingston, Ernest William Crosbie, Frederick Thomas McElwee, Arthur Myrtle Saywood, Harry Leonard Woolveridge, Arthur Elias Sutton-Jones, Patrick John Murphy, John Henry Dale, Edward Ernest Porter, M.B.E., D.C.M., Edwin Harold Eldridge, Maurice Jewison James, M.B.E., Reginald Harry Smyth, M.C., Alfred Horace Comfort, Henry Sewell Alger, Leonard Arthur Lavender, Richard Adams, Lamont Smith, Charlie Young Mitchell, John Augustus Plunkett.

Medical Service

Squadron-Leader to be Wing-Commander.—Henry Wakeman Scott, M.B., B.A.

Flight-Lieutenants to be Squadron-Leaders.—Robert Ernest Bell, M.B., Gerald Struan Marshall, O.B.E., Eric William Craig, M.C., M.B., Robert Andrew George Elliott, M.B., B.A.

Flight-Lieutenant to be Honorary Squadron-Leader.—William Rous Kemp, B.A.

German Gliders for Britain

As a direct result of the interesting experiments carried out in the Rhön Mountains in Germany during last summer, considerable interest is now being taken in the problems of gliding and soaring. Not only are the German experiments to be continued this year, but France has planned a gliding competition also. In this country, although, judging from the number of enquiries which we have received, there is considerable interest in the subject, nothing definite has

been planned. The chief reason for this is probably that the problem of constructing scientific gliders has not hitherto received any attention here. We now learn, however, that the Aachen glider on which Klemperer remained aloft for 13 minutes may be introduced in this country if sufficient interest is found to exist. The agency for this type of glider has been acquired by Mr. J. T. P. Jeyes, of 38, The Crescent, Northampton, who will be pleased to give further information relating to the details of the Aachen glider.

THE ROYAL AIR FORCE

London Gazette, December 23, 1921.

General Duties Branch

Flight Lieut. G. E. Wilson is placed on half-pay, Scale B; Nov. 28. Pilot Offr. on probation D. J. Hugh-Jones is confirmed in rank; Oct. 28.

Memorandum

Hon. Sec. Lieut. W. J. Gayes relinquishes his hon. commn.; March 25, 1919 (since granted short service commn.).

London Gazette, December 30, 1921.

General Duties Branch

The follg. are granted permanent commns. as Flying Offrs., retaining their present seny.; Nov. 17.—C. F. Horsley, M.C., R. M. C. MacFarlane, M.C., C. E. Maitland, D.F.C. Flight Lieut. H. H. Balfour, M.C., is granted a permanent commn. as a Flying Offr., with effect from April 26, 1920 (Gazette May 4, 1920, apptg. him to a short service commn., is cancelled (since promoted).

The follg. Flight Lieuts. resign their permanent commns., and are permitted to retain rank of Major.—O. Stewart, M.C., A.F.C.; Dec. 22. J. R. McCrindle, M.C., O.B.E.; Jan. 1, 1922. Flight Lieut. W. Man, D.F.C., resigns his short service commn.; Dec. 8. Flight Lieut. G. H. Errington relinquishes his short service commn. on acct. of ill-health, and is granted rank of Maj.; Dec. 31. Flying Offr. F. Edwards is placed on the Retd. List, and is granted rank of Capt.; Dec. 31.

Stores Branch

Flight Lieut. H. P. Bridges resigns his permanent commn., and is permitted to retain rank of Capt.; Jan. 1, 1922. Flight Lieut. J. W. Gage is placed on the retired list on account of ill-health; Dec. 31.

The follg. Pilot Offrs. on probation to be Flying Offrs. on probation; Aug. 9.—J. W. Gray, F. O. Hall, B. C. Powell, H. A. Murton.

Medical Service

J. W. Harper, M.D., is granted a short service commn. as Flight Lieut., with effect from, and with seny. of Dec. 14. Capt. J. S. Smith, Army Dental Corps, is granted a temp. commn. as a Flight Lieut. while attached for duty with the R.A.F., with effect from Nov. 1, 1919, and with seny. of Jan. 27, 1919. He will continue to receive emoluments from Army Funds.

Nursing Service

The follg. ladies are confirmed in the appts. as Staff Nurses, to date from June 15.—Miss N. M. M. B. Brown, Miss N. C. M. Kelly.

Memoranda

Sec. Lieut. J. H. Jacques to be Lieut.; June 5, 1919. The follg. relinquish their temp. commns. on ceasing to be empd., and are permitted to retain their ranks.—Lieut. F. O. Rose; Oct. 24, 1919 (substituted for Gazette, Nov. 7, 1919). Maj. P. L. Teed; Dec. 20. Lieut. J. H. Jacques relinquishes his temp. commn. on account of ill-health contracted on active service, and is permitted to retain his rank; June 8, 1919 (substituted for Gazette, June 20, 1919).

Lieut. A. T. Sheldrake, H.L.I. (T.F.), is granted a temp. commn. as a Sec. Lieut. (A.); Aug. 1, 1918 (since deceased).

Four Cadets are granted hon. commns. as Sec. Lieuts., with effect from the dates of their demobilisation.

Hon. Sec. Lieut. G. H. Atter is deprived of his commn. on conviction by the Civil Power; July 18.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—
Squadron Leaders.—R. B. Ward, A.F.C., from No. 29 Group Headquarters (Coastal Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22. G. J. Watney, O.B.E., from Egyptian Group Headquarters (Middle East Area) to R.A.F. Depot (Inland Area). 7.11.21. J. C. Quinell, D.F.C., from No. 3 Flying Training School (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22.
Flight Lieutenants.—T. Q. Studd, D.F.C., from School of Army Co-operation (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22. G. H. Hooper, M.C., D.F.C., from No. 207 Squadron (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22. V. R. Scriven, A.F.C., from H.M.S. "Pegasus" (Mediterranean Group) to No. 267 Squadron (Mediterranean Group). 1.12.21. G. W. Biles, D.F.C., from Central Flying School (Inland Area) to School of Naval Co-operation and Aerial Navigation (Coastal Area). 30.1.22. C. H. Young, M.B., from R.A.F. Depot (Inland Area) to No. 1 Flying Training School (Inland Area). 30.12.21. J. H. Porter, M.C., M.B., from No. 1 Flying Training School (Inland Area) to R.A.F. Depot (Inland Area). 15.1.22. G. H. H. Maxwell, M.B., from School of Technical Training (Men) (Inland Area) to Inland Area Aircraft Depot (Inland Area). 6.1.22. A. E. Barr-Sim, M.B., from R.A.F. Depot (Inland Area) to School of Technical Training (Men) (Inland Area). 4.1.22. C. W. T. Baldwin, from Inland Area Aircraft Depot (Inland Area) to R.A.F. Depot (Inland Area). 6.1.22. H. McWilliams, Daniel, M.B., from No. 31 Squadron (India) to Aircraft Park (India). 28.11.21.

THE LONDON-CONTINENTAL SERVICES FLIGHTS BETWEEN DECEMBER 18 AND DECEMBER 31, INCLUSIVE

Route†	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods				
Croydon-Paris ...	36	110	12	25	30	h. m. 2 30	D.H. 4 G-EAWH (1h. 59m.)	B. (2), D.H. 4 (1), D.H. 18 (2), G. (4), H.P. (2), Sp. (5), V. (1).
Paris-Croydon ...	38	76	9	29	28	3 27	D.H. 18 G-EAWW (2h. 19m.)	B. (3), D.H. 4 (1), D.H. 18 (2), G. (5), H.P. (3), Sp. (5), V. (1).
Totals for 2 weeks ...	74	186	21	54	58			

* Not including "private" flights.

† Including certain journeys when stops were made en route.

‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E. 5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

Egyptian Disturbances and Aeroplanes

A VERY effective measure to cope with the disorders in Egypt was, under martial law, announced last week in Suez, as follows:—"If aeroplanes perceive an assembly they will drop smoke bombs; if the assembly does not disperse they will drop shells and open fire with their machine-guns."

Washington Conference and Aircraft

So far nothing has been settled at Washington regarding aircraft limitations, but on December 30 a report was forthcoming from the Committee of Experts to which has been delegated the study of the possible control of aeroplanes in war. The findings, it is stated, of the experts would be discouraging if from the outset there had not been a feeling that little could be expected in this direction from a conference of limited membership. They suggest that the question can best be considered at a gathering of wider scope, and confess their inability to make practical proposals either as to the number of aeroplanes which a nation may have for

military use or their form of build. It is, however, understood that the Sub-Committee on aviation will recommend in their report that there be no limitation to the construction of aircraft, but that there shall be a clear definition as to their use in war-time.

British Money for Helicopters

On dit that the Air Ministry is asking the sanction of the Treasury for the offer of a £50,000 prize for a design of helicopter which will reach an altitude of 2,000 ft., remain stationary there for half an hour, be able to descend with engine stopped, and have a horizontal speed at 2,000 ft. of at least 60 m.p.h., carrying the pilot and one hour's fuel. If there is any truth in the rumour, the machine is presumably intended for military purposes, as its value to commercial aviation is negligible. In any case, the technical science relating to helicopterism is so vague at the present day that the taxpayer's money would probably be quite safe for a number of years.

A Duration Record Broken.

It is reported from Mineola that Ed. Stinson, the young American "stunt" pilot, and Lloyd Bertand have just succeeded in remaining in continuous flight for 26 hrs. 19 mins. 35 secs. They were flying an all-metal (? J. L.) monoplane, and started off from Long Island on Thursday morning last, in a snowstorm. The breaking down of the oil pump brought the flight to a close. The present duration record was established by MM. Bossoutrot and Bernard with 24 hrs. 19 mins. 7 secs.

Controversy over Michelin Cup

ACCORDING to reports from Paris, events in connection with the Michelin Cup have taken an unexpected turn. The performance put up by the Italian aviator Capt. Martinetti over an Italian circuit of 3,000 kms. has, the report states, been disputed by the French Aero Club on the grounds that Martinetti, they allege, failed to land at his point of departure after terminating the flight. There is also some talk of Martinetti having changed machines in the course of his flight, which is, of course, contrary to the regulations. It is not to be expected that the Italian Aero Club will accept this decision straight away, and probably some lively correspondence will follow during the next few days. If the reported decision of the French Aero Club is to stand, Poirée would appear to be the holder of the Cup for 1921, his performance having been the best French one, with an elapsed time of 37 hrs. 23 mins. In the meantime French aeronautical journals are suggesting that the regulations should be altered and the competition held during the summer months so as to avoid the danger of the autumn fogs.

Paris-Constantinople Line Initiated

THE two French pilots, MM. Deullin and de Marmier have just completed an out-and home flight between Paris and Constantinople, by way of blazing the trail for the regular service to be started later on. Leaving Paris on October 10 last, they covered the distance of 1,770 miles between the two capitals in 17 hours' actual flying time, having made long halts at Strasbourg, Prague, Budapest, Belgrade and Bukarest. They left Constantinople for home on November 7, and de Marmier arrived at Le Bourget on December 22, his flying time being 18 hrs. Deullin stopped at Nancy the same day. It is proposed to inaugurate a regular service shortly.

Siam and Aviation

DURING his "round-the-world" journeying Lord Northcliffe made a stay at Bangkok, and on December 23 he visited the aerodrome at Don Muang, where Sir Ross Smith alighted during his Australian flight in 1919. The Times correspondent states that Lord Northcliffe was surprised to find the air station equal to most of those in Europe.

Siam, he states, has 25 landing-places and five aerodromes. At Don Muang there are 115 'planes, including school machines, and a staff of 650 men.

It looks as if there should be a good opening for British development in this land of promise.

No. 1 Aeroplane Supply Depot Reunion Dinner

It is proposed to hold a Reunion Dinner of Officers of the late No. 1 Aeroplane Supply Depot (St. Omer, Marquise and Cologne).

The dinner will take place at the Hotel Cecil on Saturday, January 28, 1922, at 7 p.m.

All those interested are asked to communicate with Capt. J. F. Bargman at "Inglefield," Osborne Road, South Farnborough, Hants.



PUBLICATIONS RECEIVED

Report on the Health of the Royal Air Force for the Year 1920. Vol. 1, Air Publication 875. London: H.M. Stationery Office. Price 6s. net.

Fuel for Motor Transport. Second Memorandum by the Fuel Research Board. London: H.M. Stationery Office. Price 6d. net.

Converting a Business into a Private Company. By Herbert W. Jordan. London: Jordan and Sons, Ltd., 116-117, Chancery Lane, W.C. Price 1s. net.

A Short Course in Elementary Meteorology. By W. H. Pick, B.Sc. London: H.M. Stationery Office, Imperial House, Kingsway, W.C. Price 1s. 6d. net.

Report No. 115. Bending Moments, Envelope, and Cable Stresses in Non-Rigid Airships. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 68. Vortices and the Related Principles of Hydrodynamics. By A. Betz. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

SIDE-WINDS

A MOST informative and helpful data sheet relating to aluminium sheet, sections, bar, strip, wire and cable has just been compiled and issued by the British Aluminium Co., Ltd., of 109, Queen Victoria Street, London, E.C. The sheet gives in table form the weight, area, etc., relating to aluminium in these various forms, and should be very useful in the drawing-office. A copy may be had on application to the above address.

APROPOS of the favourable comment which has been evoked concerning the new gas starter for aero-engines which the Bristol Aeroplane Co., Ltd., have produced, they desire us to draw attention to the considerable amount of experimental work which had previously been carried out by the Royal Aircraft Establishment on gas starters. The work at the R.A.E. on gas starters was in the hands of the late Major Norman, the well-known authority on air-cooling, and a debt is due to his memory for the measure of development which was reached. Whilst the Royal Aircraft Establishment were responsible for the first idea of the power gas starter and for its early development, the apparatus the Bristol Aeroplane Co., Ltd., have produced is a result of further close study of the requirements which starters have to fulfil, and they have been able to place on the market a very compact light-weight starting engine to meet a need which has long been felt by the aircraft constructor. This is only another example of the valuable research work which the R.A.E. are continually carrying on, and which is of immense service to the development of British aeronautical equipment.



AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published December 29, 1921

- 24,426. H. MIDDLETON. Ornithopters or bird-winged flying machines. (172,077.)
- 24,514. T. W. FOSTER and A. DOOLEY, sen. Universal swivel workshop stand for engines. (172,080.)
- 24,979. S. EVANS. Man-power aeroplanes. (172,103.)
- 25,110. F. H. PAGE and HANDLEY PAGE, LTD. Wings for aircraft. (172,109.)
- 25,689. SOC. ANON. DES AEROPLANES, G. VOISIN. I.C. engines. (150,740.)
- 25,906. GAS ACCUMULATOR CO. (UNITED KINGDOM), LTD., and A. G. WATSON. Devices for indicating direction of ground wind. (172,141.)
- 36,247. V. A. ALMONACID. Air screws. (172,229.)

Published January 5, 1922

- 19,220. GOODYEAR TYRE AND RUBBER CO. Balloons. (147,163.)
- 25,617. D. C. LINE. Man-power aeroplane. (172,410.)
- 25,723. A. M. FOTHERINGHAM. Combined magnetic compass and dip-indicator. (172,412.)
- 28,111. A. PERADOTTO. Apparatus for indicating inclinations of aeroplane in flight. (151,996.)

If you require anything pertaining to aviation, study "FLIGHT's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C.2, not later than 12 o'clock on Saturday in each week for the following week's issue.

FLIGHT

The Aircraft Engineer and Airships

36, GREAT QUEEN STREET, KINGSWAY, W.C.2.
Telegraphic address: Truditur, Westcent, London.
Telephone: Gerrard 1828.

SUBSCRIPTION RATES

"FLIGHT" will be forwarded, post free, at the following rates:—

UNITED KINGDOM			ABROAD*		
	s.	d.		s.	d.
3 Months, Post Free...	7	7	3 Months, Post Free...	8	3
6 " " " " " "	15	2	6 " " " " " "	16	6
12 " " " " " "	30	4	12 " " " " " "	33	0

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates.

* European subscriptions must be remitted in British currency

Cheques and Post Office Orders should be made payable to the Proprietors of "FLIGHT," 36, Great Queen Street, Kingsway, W.C.2, and crossed London County and Westminster Bank, otherwise no responsibility will be accepted.